

Equations (2) Expanding brackets continued

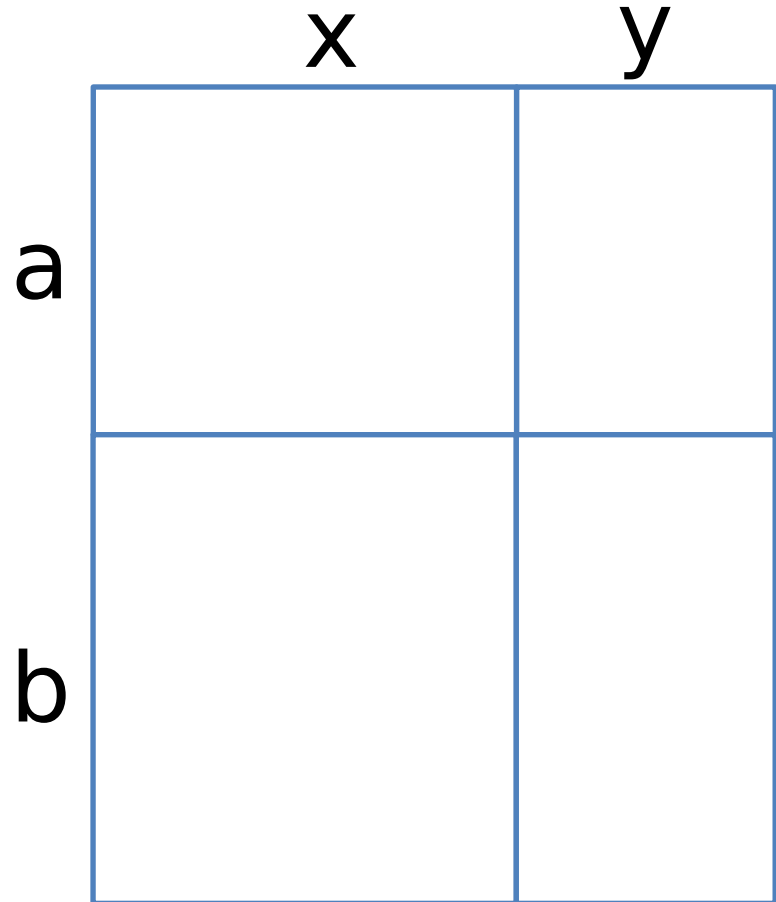
Work out the area of
rectangle in two ways...

1) By using the sides of the
big rectangle.

Area =

2) By combining the area of
the four smaller rectangles.

Area =



RECAP: Expanding single bracket

You already know how to expand a bracket when you have a single term in front of it...

$$x(2 + y) = 2 \quad ?$$

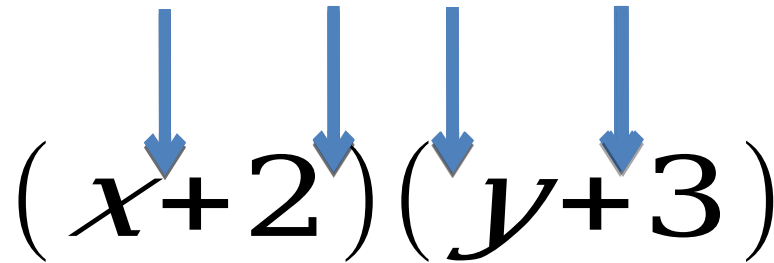
But more generally, what would happen if we multiplied two brackets together?

$$(x + 2)(x + 3) = ?$$

$$(x + y + 1)(x - 1) = ?$$

Expanding Brackets in General

- ! To expand out two brackets, multiply each of the things in the first bracket by each of the things in the second bracket.


$$(x+2)(y+3)$$

$$xy + 3x + 2y + 6$$

Click for
Choice 1

Click for
Choice 2

Click for
Choice 3

Click for
Choice 4

Test your understanding!

$$(x+2)(x+3) = x \boxed{?} = x \boxed{?}$$

$$(x-1)(x+1) \boxed{?} - 1 \boxed{?}$$

$$(2x-1)(x+2) = \boxed{?} - 2 = \boxed{?}$$

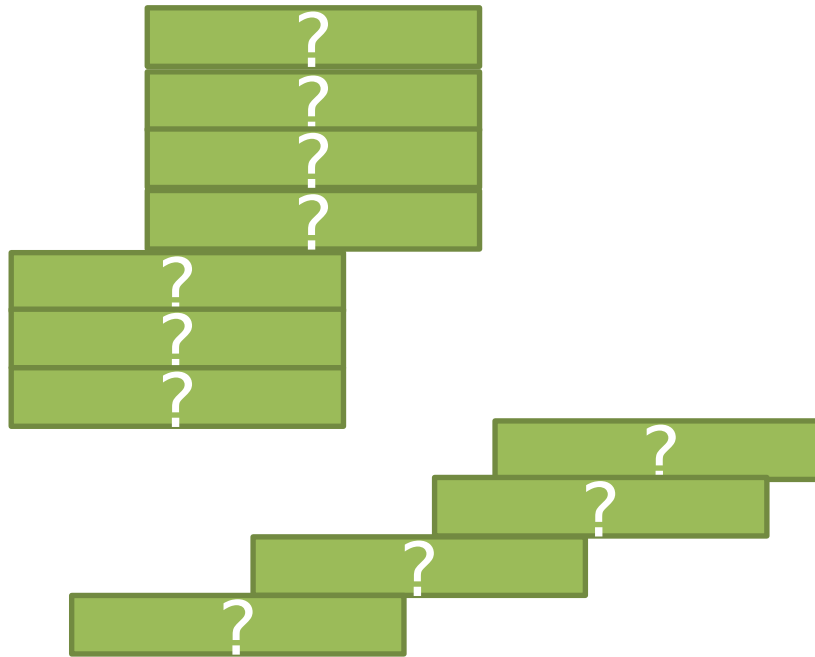
$$(2x-2)(y+ \boxed{?}) = x - 2y - 12$$

$$(x+3)^2 = (x \boxed{?} \boxed{?})$$

$$(x-2)^2 = (x \boxed{?} \boxed{?})$$

Exercise 1

1
2
3
4
5
6
7
8
9
10
11

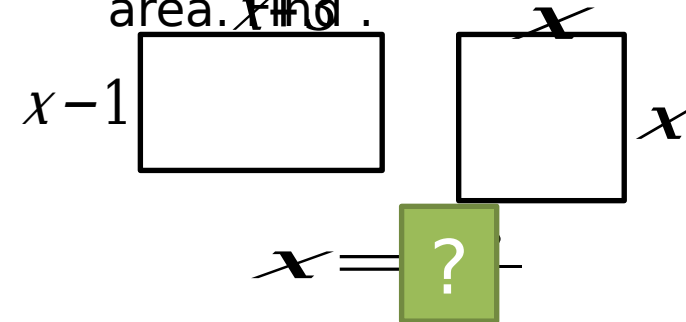


Solve the following: (by first expanding both sides of the equation)

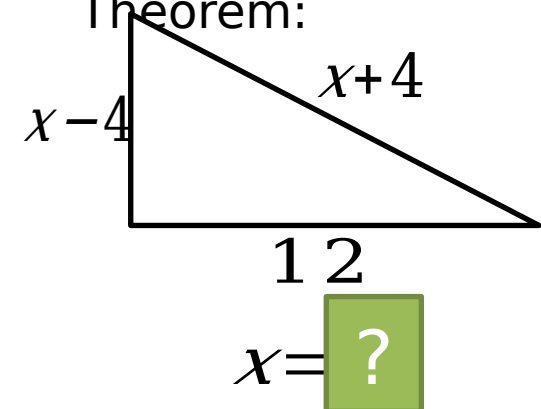
12
13
14

?
?
?

15 The rectangle and the square have the same area. Find x .



N Determine using Pythagoras Theorem:





Superpower Skill #1:

Expanding square brackets quickly

Notice that .

?

Therefore, when we have two terms in a bracket, and the bracket is squared, we can expand more quickly without having to collect terms:

	Expression	1 st Term Squared	2 x 1 st Term x 2 nd Term	2 nd Term Squared
1	$(x+3)^2 =$	x^2	$+6x$	$+9$
2	$(x-5)^2 =$?	?	?
3	$(x-8)^2 =$?	?	?
4	$(2x+1)^2 =$?	?	?
5	$(3x-2)^2 =$?	?	?



Superpower Skill #2:

Being careful with negatives

You need to be really careful when subtracting an expression you are about to expand.

Expand $1 - (x + 3)(x - 4)$

$$= \boxed{?}$$

$$1 - \boxed{?}$$

$$12$$

$$= 13 - x^2 + x$$

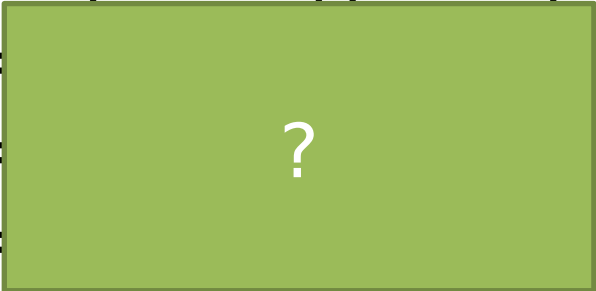
Bro Tip: Put the expanded expression in a bracket before you subtract it. This helps you avoid

Had we not used brackets in the line above, we might have (wrongly) thought this term was negative.

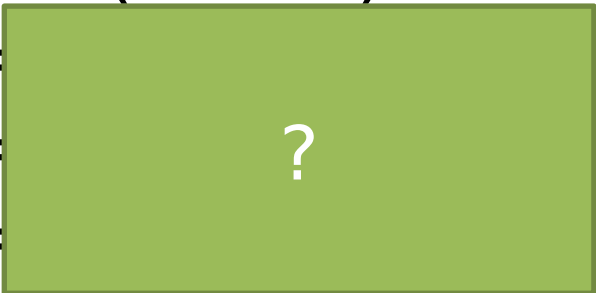
Test Your Understanding

Expand the following.

1 $x - (x + 4)(x - 1)$

$=$  $)$

2 $x^2 - (2x - 1)^2$

$=$  $1)$

1



Expanding brackets with more than 2 items

When there's more than two items in each bracket, we still use the same rule to expand: Times each thing in the first bracket by each thing in the second bracket...

$$(x + 3)(x^2 + x - 2)$$
$$= \boxed{\quad ? \quad}$$
$$= 3x - 6$$

Starter

Expand the following.

1 $(x + y)(x + y + 1)$

$$= \boxed{\text{?}} + y^2 + y$$
$$= \boxed{\text{?}} + y$$

2 $(x^2 + 3)(x^2 + x + 1)$

$$= \boxed{\text{?}} + 3x + 3$$
$$= x^4 + x^3 + 4x^2 + 3x + 3$$

Exercise 2

1 Expand the following WITHOUT working.

- a $(x + 1)^2 = \text{?} + 1$
- b $(x - 3)^2 = \text{?} + 9$
- c $(x + 4)^2 = \text{?} + 16$
- d $(x - 5)^2 = \text{?} + 25$
- e $(3x + 1)^2 = \text{?} + 1$
- f $(4x - 3)^2 = \text{?} + 9$
- g $(10x + 3)^2 = \text{?} + 60x + 9$
- h $(x - y)^2 = x^2 - 2xy + y^2$

2 Expand the following.

- a $1 - x(x - 1) = \text{?} + x$
- b $2 - (x + 1)(x + \text{?}) = 3x$
- c $x - (x - 2)(x - \text{?}) = 5x - 6$
- d $2x - (x - 3)(\text{?}) = x - 9$
- e $(2x + 1)^2 - (2x - \text{?}) = \text{?}$
- f $(3x + 3)(x - 1) - (2x - 3)(\text{?}) = x^2 - x + 3$

3 Expand the following

- a $(x + 2)(x^2 + 2x + \text{?})$
- b $+ 5x + 2$
- c $(2x + 1)(3x^2 - 4x + \text{?})$
- d $5x^2 + 2$
- e $(y^2 - y + 1)(\text{?} + y^2 - 3y + 1)$

N

$$(a - 1)(a^2 + a + 1) = a^3 - 1$$

$$(x^2 + x + 1)^2 = x^4 + 2x^3 + 3x^2 + 2x + 1$$

Expand

(Hint: it might take a time)

$$(x + 1)^0 = 1$$

$$(x + 1)^1 = x + 1$$

$$(x + 1)^2 = x^2 + 2x + 1$$

$$(x + 1)^3 = x^3 + 3x^2 + 3x + 1$$

$$(x + 1)^4 = x^4 + 4x^3 + 6x^2 + 4x + 1$$

$$(x + 1)^5 = x^5 + 5x^4 + 10x^3 + \text{?} + 10x^2 + 5x + 1$$